

Optics Developments for X-Ray Astronomy

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X-ray optics has revolutionized x-ray astronomy. The degree of background suppression that these afford, have led to a tremendous increase in sensitivity. The current Chandra observatory has the same collecting area ($\sim 10^3 \text{ cm}^2$) as the non-imaging UHURU observatory, the first x-ray observatory which launched in 1970, but has 5 orders of magnitude more sensitivity due to its focusing optics. In addition, its 0.5 arcsec angular resolution has revealed a wealth of structure in many cosmic x-ray sources. The Chandra observatory achieved its resolution by using relatively thick pieces of Zerodur glass, which were meticulously figured and polished to form the four-shell nested array. The resulting optical assembly weighed around 1600 kg, and cost approximately \$0.5B. The challenge for future x-ray astronomy missions is to greatly increase the collecting area (by one or more orders of magnitude) while maintaining high angular resolution, and all within realistic mass and budget constraints. A review of the current status of US optics for x-ray astronomy will be provided along with the challenges for future developments.